

LAB 2 (Tides, Datums and Echo Sounding)

Waiting for other 2 students, will start at 9:35am

Jiahuan Hu (jhhu@yorku.ca)

ESSE 4650 “Hydrography”

Winter 2022

Lab Assignment Schedule

Week	Date	Lab Assignments
1	14-Jan-22	Underwater acoustics (3)
2	21-Jan-22	<i>Workshop on lab assignment</i>
3	28-Jan-22	Tides, datums and echo sounding (3)
4	04-Feb-22	<i>Workshop on lab assignment</i>
5	11-Feb-22	Processing of single beam echo sounding data (7)
6	18-Feb-22	<i>Workshop on lab assignment</i> - Processing of multibeam echo sounding data (Data Import and Project Creation) (6)
-	26-Feb-22	No classes – Reading week
7	04-Mar-22	Mid-term examination - <i>Workshop on lab assignment</i>)
8	12-Mar-22	Processing of multibeam echo sounding data (Generation of Georeferenced Bathymetry) (6)
9	19-Mar-22	Processing of multibeam echo sounding data (Generation and Export of Bathymetric Products) (5)
10	26-Mar-22	<i>Workshop on lab assignment</i> – Course Project introduction
11	01-Apr-22	<i>Course Project workshop</i>
12	08-Apr-22	Course Project due, project presentations

Questions for you : will you be able to come in-person for lab3?

Online	In-person	Both
		3

Yorku VPN (Pulse Secure)	OneDrive/USB DISK
Remote Desk	
OneDrive	

Lab delivery



LE/ESSE4650 M - Hydrography (Winter 2021-2022)

[Dashboard](#) / [My courses](#) / [LE/ESSE4650 M - Hydrography \(Winter 2021-2022\)](#) / [Lab assignments](#) / [Lab 2 - Tides, Datums, and Echo Sounding](#)

Lab 2 - Tides, Datums, and Echo Sounding

Opens: Thursday, 27 January 2022, 10:00 PM

Due: Friday, 11 February 2022, 11:59 PM

 Lab_2_ESSE4650_Hydrography_W2022.pdf	27 January 2022, 1:07 PM
 Using_TideTables.pdf	27 January 2022, 1:07 PM

Grading summary

Lab 2: Tides, Datums and Echo Sounding

Question 1

Question 1 (20)

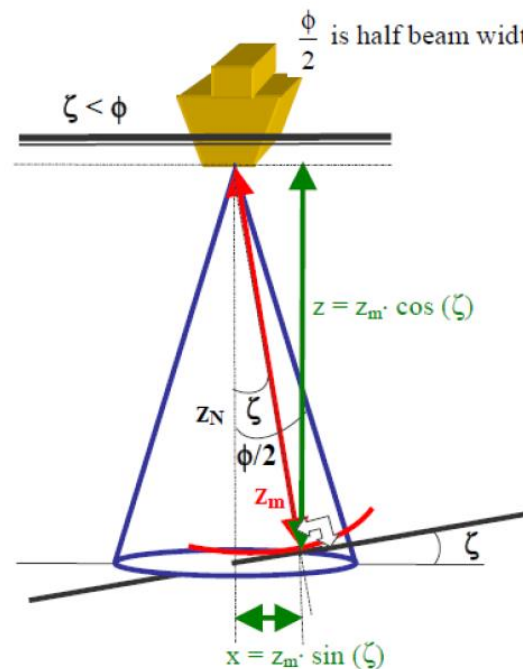
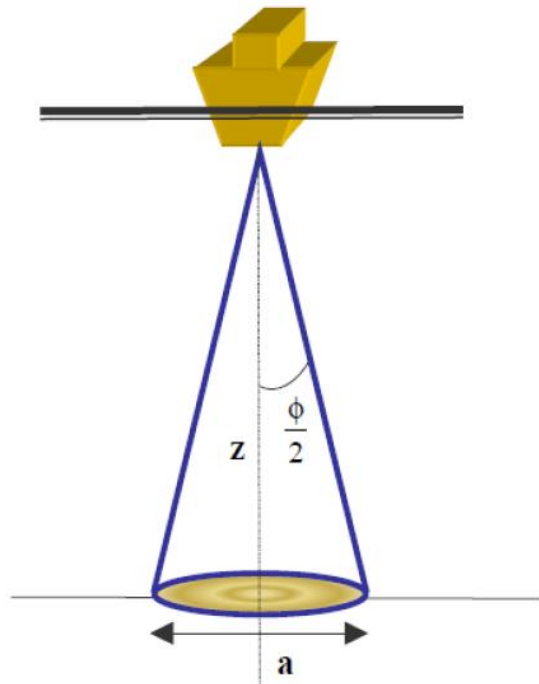
Using resources from textbooks, websites, and journal articles for research, in your own words, differentiate between analogue and digital echo sounders, including operation details during surveying and possible advantages/disadvantages between both systems.

Question 2

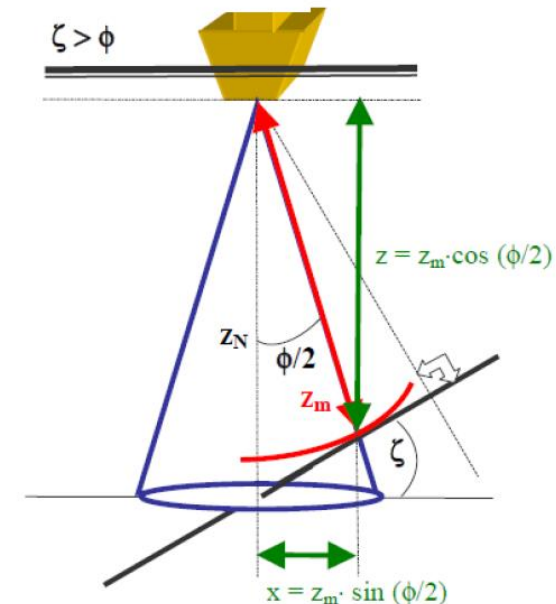
Question 2 (20)

2.1) On a small surveying vessel, a single beam echo sounder emits a 36 m long beam from its transducer to the seafloor. The width of the beam is 6.7° . Determine the resultant footprint size on the seafloor.

2.2) From a slant distance of 48 m, using the same beam width from (2.1), another measurement was made by the echo sounder on a sloping seafloor with an inclination of 10.2° deviating from its horizontal plane. Describe and quantify the source of error which affects your depth measurement.



a) slope less than one half the beam width



b) slope greater than one half the beam width

Question 3

Question 3 (25)

Using tide tables, you are required to determine the height of the water level (in feet) with respect to a chart depth of 13.7 feet for a secondary port (Hooper Island, Md.) at a given time of 9:35 AM on Feb 14, 2017 (in EST). You are required to adequately illustrate each step in the calculation process undertaken (e.g., using print screens of data referred from tide tables, etc.).

Tide Tables

- **Tide tables**, or tide charts, are used for tidal prediction and show the daily times and levels of high and low tides for a particular location.
- **Tide tables** are usually published by the [National Oceanic and Atmospheric Administration \(NOAA\)](https://tidesandcurrents.noaa.gov/historic_tide_tables.html)

https://tidesandcurrents.noaa.gov/historic_tide_tables.html

What is tidal prediction ?

- We usually want to find the water height with respect to our chart datum for a secondary port at a given the time, day, month and year

Question 4

Question 4 (20)

Prior to conducting a hydrographic survey in Lake Ontario (which is one of five lakes belonging to the Great Lakes), you are tasked with delivering information to your survey crew, which requires you to conduct some research. Using resources from textbooks, websites and journal articles, in your own words, answer and discuss the following:

- 4.1) What is the vertical datum used for the Great Lakes, including its relation with the North American Datum and historical aspects of previously used datums on these lakes?
- 4.2) What is the height system used in the Great Lakes and its relation with orthometric heights?

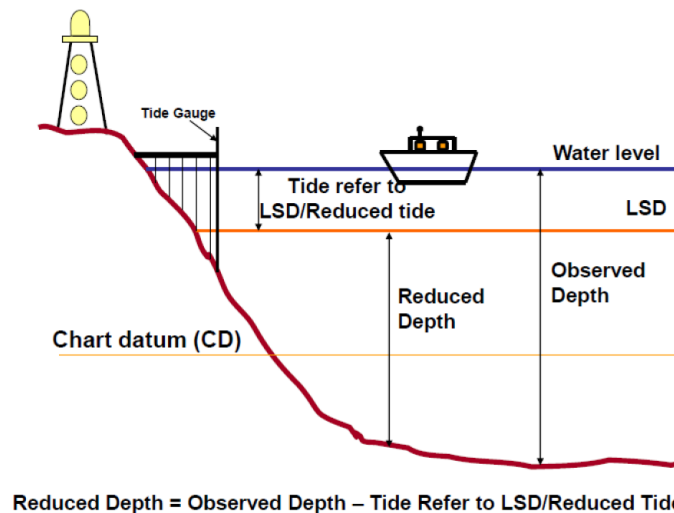
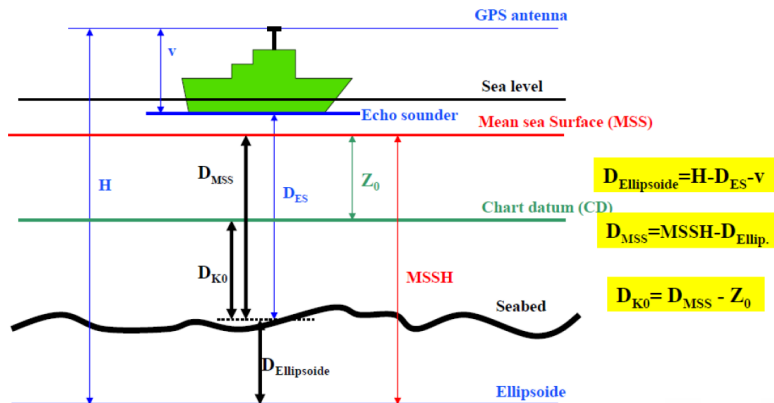
Question 5

Question 5 (15)

Determine the Reduced Depth to Chart Datum using the Ellipsoid as vertical reference for sea floor hydrographic survey in a region with tidal effect. Given:

h	Ellipsoidal height of the GPS antenna	45m
ZA	Offset between GPS antenna and vessel's reference point	10m
D	Observed depth (corrected for errors and heave)	40m
DD	Dynamic Draught	2m
ZT	Transducer offset	1m
SEP	Separation	56m

Provide a diagram illustrating the geometry of the components of the vertical position and supporting your solution.



LAB report

Submission of lab report

The lab report must address each question, describe the steps of the work, and provide the findings and answers for each question. The lab report should include: description and explanations of the details of the steps and mathematical expressions/formulae used, programming flow charts and pseudo code, programming code, illustration of computations and results obtained. Citations/references must be provided when using external sources (e.g., books, web, journal papers) for research. Digital versions of the report are to be submitted. Make sure to reference your sources. Use appendices when necessary. Include title page and scope of this exercise. It must be a professional report. Pay attention to structure, syntax, grammar, spelling and presentation. All code/scripts created and used should also be included in the submitted reports.

2022-02-04

- If you have any question about questions in Lab 2, you can **speak/type/Email** me (jhhu@yorku.ca)
- I'll be in the zoom meeting during 9:30-10:30 am
- *Please remember to submit the report before the due (**February 11, 2022**)